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Taxonomic studies in *Chrysoderma*, *Corneromyces*, *Dendrophysellum*, *Hyphoradulum*, and *Mycobonia*

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Abstract — Eight poorly known or unusual crustose and pileate basidiomycete species were studied. These included the type specimens of three monotypic genera: *Chrysoderma alboluteum* from Réunion is conspecific with *Cerocorticium molle*; *Dendrophysellum amurense* from the Russian Far East is a species of *Vararia*; and *Hyphoradulum conspicuum* belongs in *Pseudolagarobasidium* and is the first representative of the genus from Europe. *Corticium murrillii,* from Mexico, is congeneric with *Corneromyces kinabalui*. New combinations *Vararia amurensis*, *Pseudolagarobasidium conspicuum*, and *Corneromyces murrillii* are proposed. *Mycobonia flava* and *M. brunneoleuca* are macroscopically similar species with diagnostically distinct basidiospore shape and size. *Mycobonia disciformis* is accepted in *Mycothele*, and *Mycobonia winkleri* represents a species of unknown affinities. Recent molecular phylogenetic studies indicate that *Mycobonia* is embedded in *Polyporus* sensu stricto and is a synonym of *Polyporus*. Transferring *M. brunneoleuca* and *M. flava* to *Polyporus* requires the creation of the replacement names, *P. polyacanthophorus* and *P. epitheloides*.

Key words — *Amylocorticiales*, cyanophilous basidiospores, *Epithele*, *Favolus curtipes*, *Polyporales*

Introduction

Tremendous advances in the systematics of basidiomycetes have been made in the last twenty years since the advent of molecular phylogenetics. Nevertheless, morphological studies are still essential to advance this discipline. In this paper, eight species of poorly known crustose or pileate basidiomycetes are described and illustrated. Type specimens of *Chrysoderma alboluteum, Corticium murrillii, Dendrophysellum amurense,* and *Hyphoradulum conspicuum* were examined. In addition, the genus *Mycobonia* (*Polyporales*) is revisited. Species of *Mycobonia* produce stipitate, pileate basidiomes with hyphal pegs penetrating a smooth hymenial surface. Four species have been

included in *Mycobonia* — *M. brunneoleuca*, *M. disciformis*, *M. flava*, and *M. winkleri* (Jülich 1976). *Mycobonia brunneoleuca* is considered a synonym of *M. flava* by some authors, and *M. disciformis* was transferred to the monotypic genus *Mycothele* by Jülich (1976). Little is known about *M. winkleri*, which has not been studied since it was first described in 1911. In this paper, *Mycobonia brunneoleuca* and *M. flava* are accepted as distinct species and transferred to *Polyporus* Adans. The literature concerning *M. flava* and *M. brunneoleuca* is critically examined. All the taxa are described and illustrated.

Materials & methods

Thin, freehand sections from basidiomes were mounted in Melzer's reagent (Kirk et al. 2008) or in 1% (weight/volume) aqueous phloxine and 2% (w/v) aqueous potassium hydroxide. Cyanophily of basidiospore and hyphal walls was observed in 0.1% cotton blue in 60% lactic acid (Kotlaba & Pouzar 1964; Singer 1986). Basidiome sections were mounted in freshly prepared sulfovanillin solution (1 g vanillin, 3 ml distilled water, 8 ml concentrated sulfuric acid); a positive reaction was recorded if contents of the cystidium turned black. Drawings were made with a camera lucida attachment on an Olympus BH2 compound microscope. Q values were obtained from dividing average basidiospore length by width (Kirk et al. 2008). Basidiospores are sometimes scarce in specimens, thus Q values based on less than 30 basidiospores are approximate and indicated with an asterisk (*). Color codes are from Kornerup & Wanscher (1978) except that capitalized color names follow Ridgway (1912). Herbarium code designations follow Index Herbariorum (Thiers 2014). Accepted species names are in boldface.

Taxonomy & discussion

Chrysoderma alboluteum Boidin & Gilles, Cryptog. Mycol. 12: 127. 1991.

Figs 1–2, 10–11

= *Corticium molle* Berk. & M.A. Curtis, J. Linn. Soc., Bot. 10: 336. 1868 ["1869"].

≡ ***Cerocorticium molle*** (Berk. & M.A. Curtis) Jülich, Persoonia 8: 219. 1975.

= *Corticium armeniacum* Sacc., Syll. fung. 6: 637. 1888.

≡ *Terana armeniaca* (Sacc.) Kuntze, Revis. gen. pl. 2: 872. 1891.

= *Corticium ceraceum* Berk. & Ravenel, in Massee, J. Linn. Soc., Bot. 27: 150. 1890 ["1891"].

= *Cerocorticium bogoriense* Henn. & E. Nyman, Monsunia 1: 139. 1900 ["1899"].

= *Cerocorticium tjibodense* Henn., Monsunia 1: 139. 1900 ["1899"].

= *Corticium aureolum* Bres., Ann. Mycol. 9: 272. 1911.

Basidiome resupinate, widely effused, orbicular at first then confluent, ≤10 × 3 cm, rarely ≤1 m long, often breaking up into smaller pieces when dried, often slightly detached from substrate, ≤650 µm thick, ceraceous to corneous, smooth to slightly warted, white at first, then dull yellow, light orange (5A4), brownish orange (6C7), brown [7D(6–7)], Warm Buff, Russet, Tawny, Hazel, or Snuff Brown, sometimes slightly cracked on drying. Context white to cream-colored. Margin distinct, abrupt, edges detached or curling slightly away from

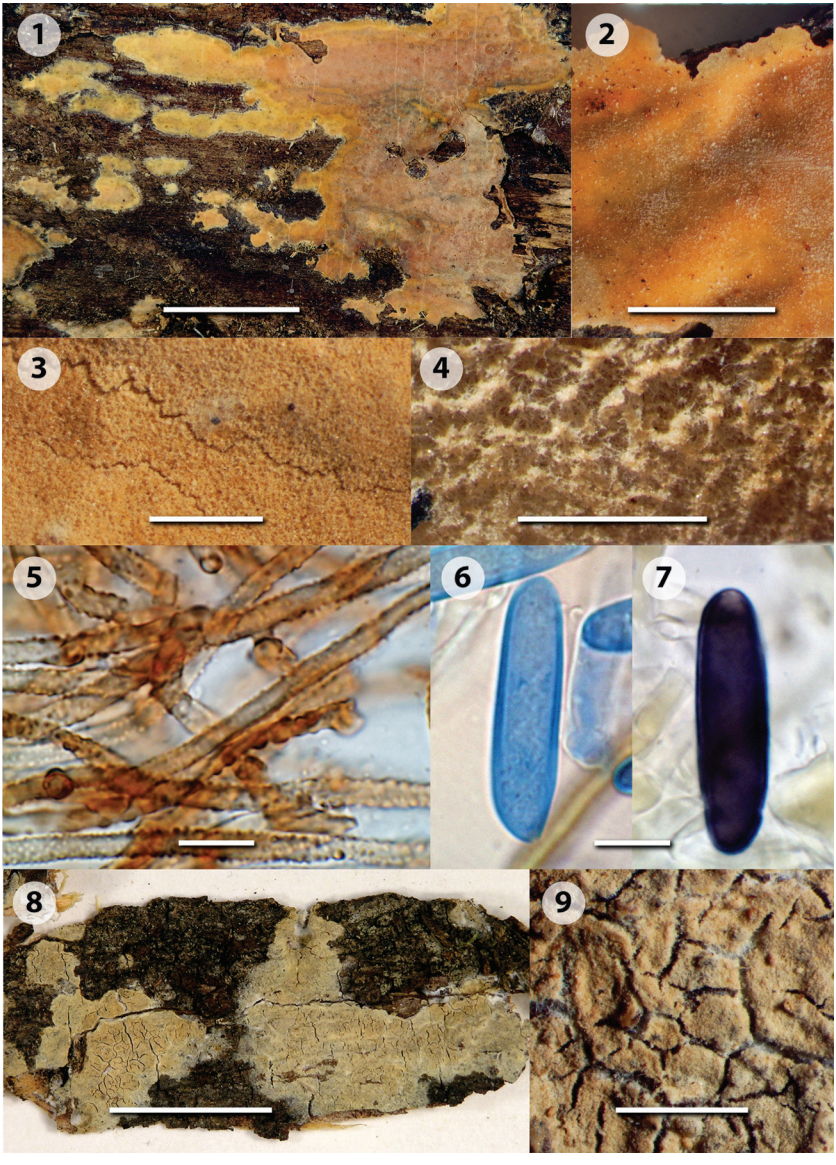
substrate, thickly fibrillose, or thinning out, concolorous with hymenium, white, or dark yellow.

Hyphal system monomitic with clamped generative hyphae. Subiculum ≤400 µm thick, a moderately dense, non-agglutinated tissue of more or less vertical hyphae; subicular hyphae (2–)3–6 µm diam, clamped, moderately branched, walls hyaline, thin to 1.5 µm thick, smooth, acyanophilous. Subhymenium ≤75 µm thick, a dense, compact but non-agglutinated tissue of vertically arranged hyphae; subhymenial hyphae 4–5.5 µm diam, clamped, frequently branched, walls hyaline, thin, smooth. Hymenium ≤100 µm thick, a dense, non-agglutinated palisade of hyphidia and basidia sometimes embedded in mucilaginous material. Hyphidia sometimes absent, when present filamentous with slight constrictions or swellings, sometimes with knobby outgrowths at apex, 35–70 × 2–4 µm diam, clamped at base, rarely branched, walls hyaline, thin or sometimes basally thickened, smooth. Basidia narrowly clavate with a long stalk, (40–)65–85(–100) × 7.5–10(–12) µm, clamped at base, often containing oil-like inclusions, walls hyaline, thin to slightly thickened, smooth, 4-sterigmate, sterigmata 7–10 × 1.5–2.2 µm. Basidiospores scarce to numerous, narrowly cylindrical to cylindrical, (13–)15–20(–23) × 4.5–8(–9) µm, average of five specimens 16.4–19.4 × 5.7–7.9, Q = (2.1–)2.6–3.1, often containing oil-like, cyanophilous materials, walls hyaline, thin, smooth, acyanophilous, not reacting in Melzer's reagent.

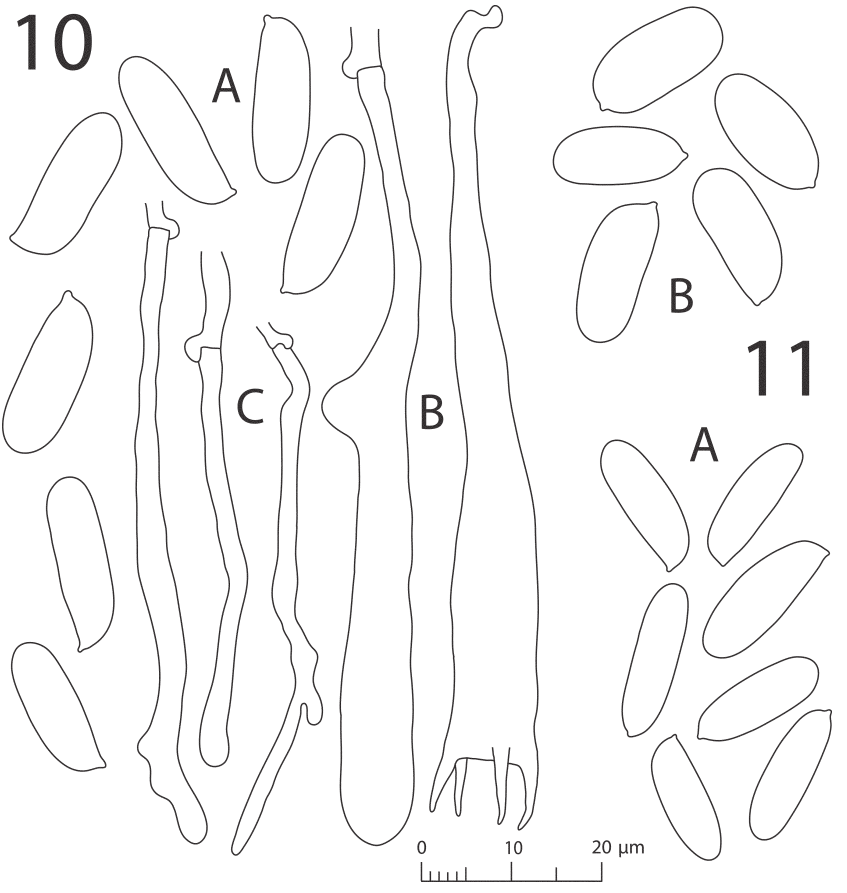
Habitat & distribution — On bark and wood of various dead angiosperms, occasionally on or under bark of living trees, throughout tropical and subtropical areas of North America, South America, Asia, and Africa.

Type specimens examined — **RÉUNION**. Anse des Cascades, sur branche tombée au bordure de l'eau, 6 avril 1990, J Boidin (LY 14412, **holotype** of *C. alboluteum*). **UNITED STATES.** South Carolina: ad corticeum ramulosque Corni, 1855, H Ravenel – Fungi Caroliniana, Fasc. III no. 29 (BPI 280736, 280735, **syntypes** of *C. ceraceum*).

Additional specimens examined — **BRAZIL**. Paraná: Curitiba, Capão da Imbuia, on decayed, dicot trunk, 16 Nov 1992, AAR de Meijer 2367 (CFMR). São Leopoldo: in ligno frondoso, 1907, Rick – Fungi Austro-Americani no. 240, as *Aleurodiscus alboroseus* Bres. (BPI 280723, as *C. ceraceum*). **MEXICO**. Orizaba, Rincon Grande and El Barrio, 4000 ft, on decorticate branch, 10–14 Jan 1910, WA & EL Murrill 54615 (BPI 280733, as *C. ceraceum*). **PUERTO RICO**. Luquillo Municipio: Sabana barrio, ridge above chicken farm along Rio Sabana, on decorticated hardwood, 30 Jun 1996, KK Nakasone (CFMR FP 150011). **RÉUNION**. St. Gilles I, en partie vivante *Casuarina equisetifolia* L. (bark), 26 avril 1985, J Boidin (LY 11356, as *C. alboluteum*); St. Gilles II, ravine, sur branche au sol, 26 avril 1985, J Boidin (LY 11373, as *C. alboluteum*). **SOUTH AFRICA**. No location, on bark, no date, P van der Bijl 13 (BPI 280731). **UNITED STATES.** Florida: Highlands Hammock, on bark of *Quercus* sp., 8 Feb 1937, CL Shear 330 (BPI 28038). Louisiana: Lafayette Parish, on rotten *Cornus florida* L., 7 May 1887, AB Langlois 1467 (BPI 289279, as *C. armeniacum*); St. Martinsville, on bark, 21 Apr 1897, AB Langlois 2389 (BPI 330776, as *C. ceraceum*). South Carolina: on *Cornus* sp., no date, H Ravenel, Ellis — North American Fungi no. 607 (BPI 280278).



Figs 1–9. ***Cerocorticium molle*** (FP 150011). 1. Basidiome. ***Chrysoderma alboluteum*** (LY 11356). 2. Basidiome. ***Corticium murrillii*** (isotype HUH 00290581). 3. Basidiome surface; 4. close-up of basidiome surface; 5. subicular hyphae in Melzer's reagent; 6. basidiospore with cyanophilous walls; 7. basidiospore with bluish black, amyloid walls in Melzer's reagent. ***Dendrophysellum amurense*** (holotype TAAM 015561). 8. Basidiome; 9. close-up of hymenial surface. Scale bars: 1, 8 = 10 mm; 2 = 2 mm; 3, 4, 9 = 1 mm; 5, 6 = 10 μm.



Figs 10–11. ***Corticium ceraceum*** (syntype BPI 0280736). 10. A. Basidiospores; B. basidia; C. hyphidia. ***Cerocorticium molle***. 11. Basidiospores: A. from BPI 0280731; B. from BPI 0280733.

Descriptions & illustrations — Boidin & Gilles (1991, as *C. alboluteum*), Burt (1926: 216, as *C. ceraceum*), Hjortstam (1983), Höhnel & Litschauer (1907, as *C. ceraceum*), Jülich (1975), Maekawa et al. (2003), Nakasone (2008, as *C. aureolum*), Talbot (1951, as *C. armeniacum*), Trierveiler-Pereira et al. (2009), Wu & Chen (1990).

Comments — *Cerocorticium molle* is characterized by yellow, orange, or brown, ceraceous to corneous basidiomes, simple hyphidia, large basidia, and large, cylindrical to narrowly cylindrical basidiospores. The basidiospores are variable in shape and size, sometimes within a single specimen. Höhnel's (1910) and Jülich's (1975) synonymies of *Cerocorticium bogoriense* and *C. tjibodense*, both from Java, with *C. molle* are accepted.

There is no doubt that *C. alboluteum* is conspecific with *C. molle* as suggested by Hjortstam & Larsson (1995). Although hyphidia were not observed in specimens of *C. alboluteum* examined, basidiomes and basidiospores are typical for the species. Boidin & Gilles (1991) noted that in *C. alboluteum* the basidiospore walls were pale yellow, producing a mass basidiospore color of yellowish orange, and calculated the average basidiospore size of three specimens as 12.8–14.6 × 4.4–5.1 µm, Q = 2.8–3.

Corticium murrillii Burt, Ann. Missouri Bot. Gard. 13: 289. 1926. FIGS 3–7, 12

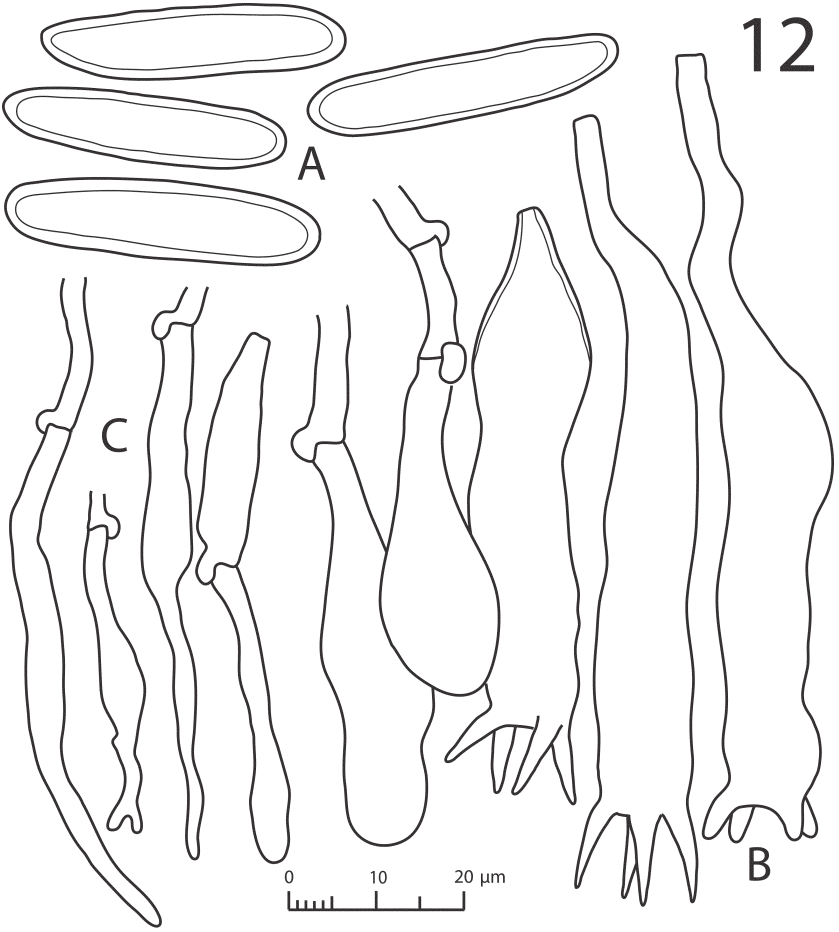
≡ ***Corneromyces murrillii*** (Burt) Nakasone, **comb. nov.**

MycoBank MB812353

BASIDIOME resupinate, widely effused, ≤9 × 3.5 cm, loosely attached, ≤900 µm thick (Burt 1926), soft, fragile, membranous, abhymenial surface fibrous, felty, brown (7E8), turning black in KOH then fading, sometimes hyphal strands found under basidiome or in the substrate. HYMENIAL SURFACE smooth, even, finely farinaceous, orange white to pale orange [5A(2–3)], greyish orange [5B(4–5)], brownish orange [5C4–6)], yellowish brown (5D6), Cream-Buff, or Chamois, black in KOH then fading to light brown; cracks occasional. CONTEXT with a thin, dark brown layer next to substrate and a thicker, cream-colored upper layer. MARGIN thinning out, fibrillose, loosely attached or detached, concolorous with hymenium or developing a dark brown edge, sometimes poorly developed hyphal strands present.

HYPHAL SYSTEM monomitic with clamped generative hyphae. SUBICULUM ≤750 µm thick, a non-agglutinated tissue composed of brown, rough-walled subicular hyphae loosely arranged parallel to substrate, then hyphae turning into hymenium, becoming hyaline; subicular hyphae of two types: (a) next to substrate 3–5.5 µm diam, clamped, moderately branched, walls yellow to brown, ≤1.1 µm thick, smooth or ornamented with tiny tubercles; (b) in upper subiculum 3–6 µm diam, clamped, moderately branched, walls hyaline, thin, smooth. SUBHYMENIUM a non-agglutinated, scarcely differentiated tissue of upright hyphae; subhymenial hyphae 2.2–5 µm diam, clamped, moderately branched, walls hyaline, thin, smooth. HYMENIUM a palisade of hyphidia and basidia. HYPHIDIA scarce, filamentous, obclavate, or narrowly clavate, (25–)35–65 × (3–)4–6.5(–10) µm, clamped at base, walls hyaline, thin, smooth. BASIDIA collapsing soon after ejecting spores, obclavate at first then clavate to cylindric, usually with a distinct stalk, (35–)40–90(–110) × 10–14 µm, clamped at base, walls hyaline, thin or slightly thickened at base, smooth, 4-sterigmate, sterigmata

FIGS 12–13. ***Corticium murrillii*** (holotype BPI 0282179). 12. A. Basidiospores; B. basidia; C. hyphidia. ***Dendrophysellum amurense*** (holotype TAAM 015561). 13. A. Basidiospores; B. basidia; C. gloeocystidia; D. subicular hypha; E. skeletal-like hyphae; F. dichohyphidia.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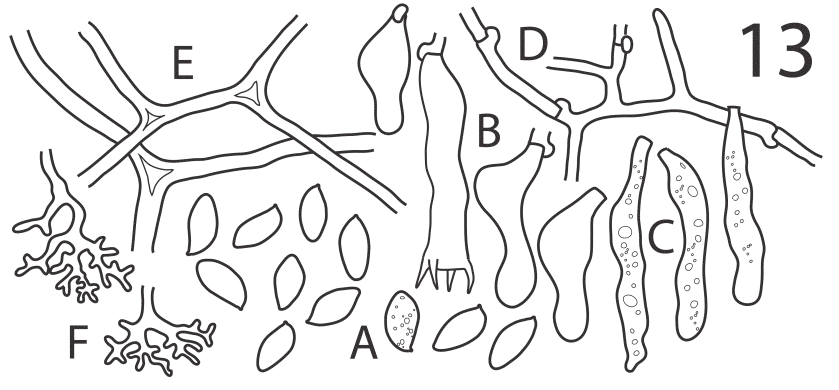
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≤17 × 3.5 µm. Basidiospores abundant, narrowly cylindric to allantoid, (25–)28–40(–43) × (7.2–)8–11(–11.5) µm, averages of three specimens 28.9–29.6 × 8.7–10.4 µm, Q = 2.8–3.4, average of isotype at FH 34.4 ± 4.2 × 9.9 ± 0.9 µm, Q = 3.5 ± 0.4, walls hyaline, occasionally pale yellow, thin to 1.3 µm thick, smooth, cyanophilous, dark blue-black in Melzer's reagent.

Habitat & distribution — On bark and wood of dead angiospermous branches and logs in subtropical and tropical Central and South America.

Type specimens examined — **MEXICO.** Jalapa, 5000 ft, on bark of decaying log, 12–20 Dec 1909, WA & EL Murrill 182 (BPI 0282179, **holotype**; NY 00776553, NY 00562612, and FH HUH-00290581, **isotypes**).

Specimens examined — **COLOMBIA**. Magdalena, Sierra Nevada de Santa Marta, Reserva Forestal San Lorenzo, on wood, 17–19 June 1978, L Ryvarden 16070 (O, as "*C. kinabalui*"). **ECUADOR.** Sucumbíos Province: Reserva Natural de Cuyabeno, 300 m.a.s.l., on hanging branch, 28 June–15 July 1993, M Nuñez 306 (O F–902593, as "*C. kinabalui*").

Descriptions & illustrations — Burt (1926), Liberta (1969).

Comments — *Corneromyces murrillii* is an uncommon and unusual species characterized by a soft fragile basidiome, hyphidia, large basidia, and large narrowly cylindric to allantoid basidiospores with amyloid and cyanophilous walls. There was a wide range in basidium and basidiospore size among the specimens examined. *Corneromyces murrillii* is similar to *C. kinabalui* Ginns from Borneo, which has brown aculeate basidiomes, smooth brown subicular hyphae, and brown basidiospores (Ginns 1976). Basidiospore sizes in the two species are similar. The average basidiospore size of the isotype of *C. kinabalui* at BPI, BPI 0290583, is 27 ± 2.9 × 9.1 ± 1.1 µm, Q = 3 ± 0.3.

One isotype of *C. murrillii* (NY 00776553) is a large collection that is intermixed with small basidiome fragments of *Rhizochaete radicata* (Henn.) Gresl. et al. Hjortstam & Ryvarden (2001, 2008) erroneously reported *C. kinabalui* from Columbia and Ecuador; two of the voucher specimens were examined and identified as *C. murrillii*.

The affinities of *Corneromyces* Ginns are not known. Ginns (1976) considered creating a new family for *Corneromyces* but placed it instead in *Coniophoraceae* Ulbr. Citing the strongly amyloid, brown, thick-walled basidiospores, Jülich (1979) proposed the family *Corneromycetaceae* Jülich. Recent molecular phylogenetic studies have identified a new order, *Amylocorticiales* K.H. Larss. et al. This order is characterized by varied basidiome habit and hymenophore configuration, a monomitic nodose-septate hyphal system, and smooth thin- or thick-walled basidiospores that are amyloid in most species (Binder et al. 2010). *Corneromyces* may belong in the *Amylocorticiales,* which is sister to the *Agaricales* Underw., instead of with *Coniophora* DC. and allies in the *Boletales* E.-J. Gilbert.

Dendrophysellum amurense Parmasto, Consp. syst. cortic.: 206. 1968.

Figs 8–9, 13–15

≡ ***Vararia amurensis*** (Parmasto) Nakasone, **comb. nov.**

MycoBank MB812355

Basidiomes resupinate, effused, beginning as circular to irregular colonies, then coalescing, ≤5 × 20 mm, adnate, thin, ≤150 µm thick, subceraceous, smooth to finely granulose over the irregular contours of the substrate, greyish yellow [4(B–C)(3–4)], greyish orange [5B(3–4)], to brownish orange (5C3), rimose, exposing white, felty to cottony context; cottony white mycelial tissue developed in substrate and occasionally beneath basidiome. Margin adnate, thinning out, white, farinaceous.

Hyphal system dimitic with clamped generative hyphae and aseptate dichohyphidia. Mycelial Tissue cottony, white, composed of skeletal-like hyphae; hyphae 2.2–3.5 µm diam, occasionally clamped or appearing aseptate, sparsely branched, straight, non-staining, walls hyaline, thin to thick, smooth. Subiculum ≤100 µm thick, basal layer next to substrate a compact, agglutinated tissue of short-celled hyphae arranged more or less parallel to substrate, then hyphae becoming upright, mostly indistinct and degraded although with a few, intact, phloxine-stained hyphae; subicular hyphae from basal layer 3–5 µm diam, clamped, frequently branched, walls hyaline, thin, smooth; hyphae of upper subiculum 1.5–2.2 µm diam, clamped, moderately branched, walls hyaline, thin, smooth. Subhymenium and hymenium indistinct, composed of dichohyphidia, gloeocystidia, and basidia intermixed with abundant, coarse, hyaline crystals. Dichohyphidia scattered in hymenium, not enclosed, dendriform, ≤20 × 20 µm, with a main stalk, 2–2.5 µm diam, and multiple, short branches, walls hyaline, slightly thickened, smooth, cyanophilous, dextrinoid. Gloeocystidia scarce, inconspicuous, cylindrical to narrowly clavate, occasionally papillate, 23–27 × 3–4 µm, clamped at base, protruding ≤15 µm, containing oil-like material, negative in sulfovanillin, walls hyaline, thin, smooth. Basidia suburniform at first, then narrowly cylindrical, flexuous, about 26 × 5 µm, clamped at base, protruding ≤10 µm, 4-sterigmate, walls hyaline, thin, smooth. Basidiospores numerous, agglutinated, often collapsed, subfusiform to pip-shaped (in face view), 6–8(–9.3) × 3–3.7(–4) µm, x = 7.1 ± 0.7 × 3.3 ± 0.3 µm, Q = 2.1 ± 0.3, walls hyaline, thin, smooth, acyanophilous, faintly amyloid.

Habitat & distribution — On bark of dead *Picea*; known from the type locality in northeastern Asia.

Type specimen examined — **RUSSIA**. Khabarovsk region: Selikhino, Kabansopka, on bark of fallen trunk of *Picea jezoensis* (Siebold & Zucc.) Carrière, 18 Aug 1961, E Parmasto (TAAM 015561, **holotype**).

Comments — *Vararia amurensis* is characterized by clamped generative hyphae, dextrinoid and cyanophilous dendriform dichohyphidia, gloeocystidia, suburniform basidia, and subfusiform amyloid basidiospores. A typical catahymenium was not observed. Mature basidia are rare, and gloeocystidia are inconspicuous and easily overlooked. It is morphologically similar to *V. mediospora* var. *makokouensis* Boidin et al. from Gabon, which has basidiospores of the same size and shape but lacks clamp connections (Boidin et al. 1980). Parmasto (1968: 146) placed *Dendrophysellum* Parmasto in *Corticiaceae* subfam. *Aleurodiscoideae* Parmasto, but it is morphologically similar to taxa in *Vararia* sect. *Fusamyspora* Boidin & Lanq. that have dextrinoid and cyanophilous dendrohyphidia, smooth or slightly ornamented amyloid basidiospores, and sulfovanillin-negative gloeocystidia (Boidin & Lanquetin 1975). Thus, the monotypic genus *Dendrophysellum* is placed in synonymy under *Vararia* and *D. amurense* is transferred to *Vararia*.

Hyphoradulum conspicuum Pouzar, Česká Mykol. 41: 26. 1987. Figs 16–17, 25

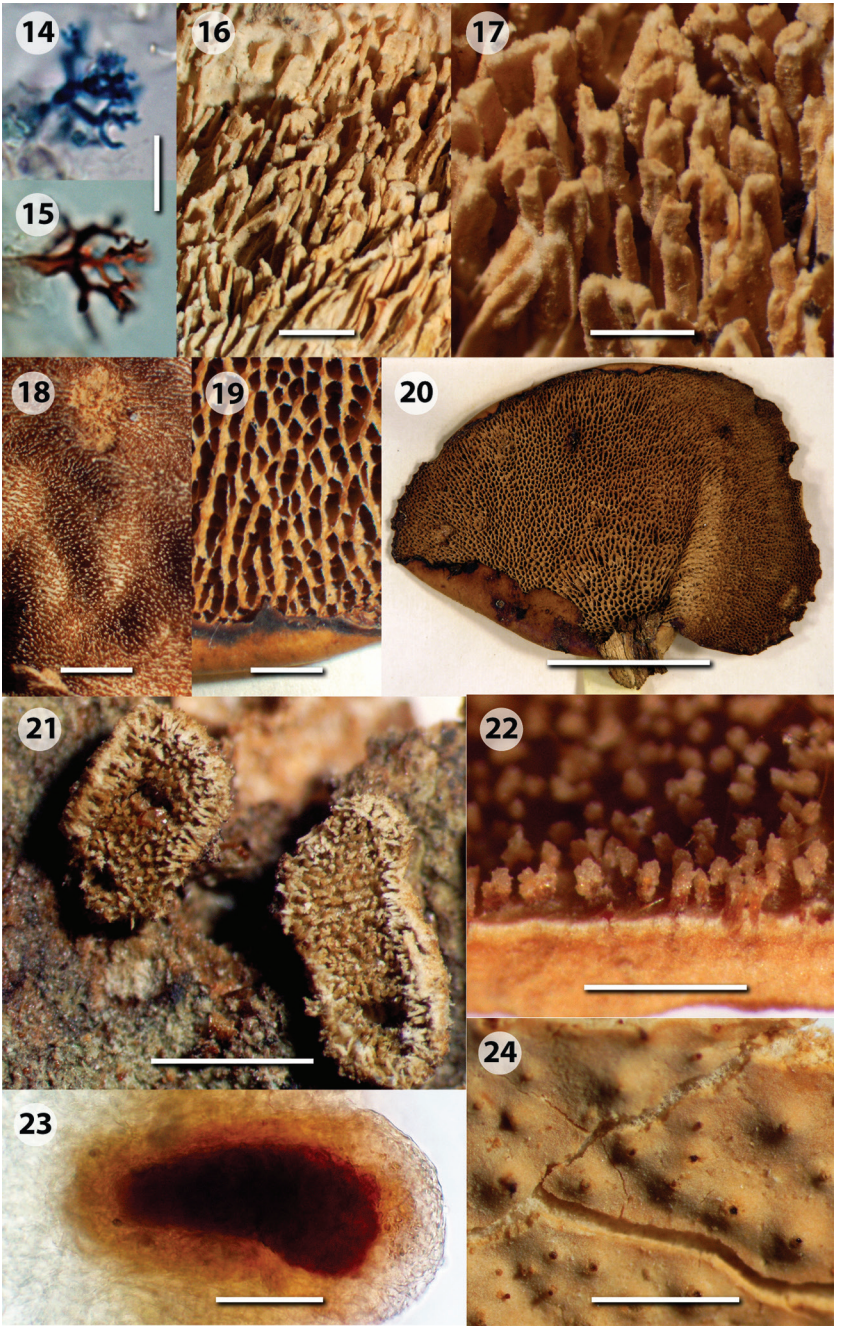
≡ ***Pseudolagarobasidium conspicuum*** (Pouzar) Nakasone, **comb. nov.**

MycoBank MB812356

Basidiome resupinate, widely effused, soft, fragile, cretaceous, spinose, yellowish white (4A2), greyish yellow (4B3), or greyish orange (5B3), no color change with KOH; cracks absent. Hymenial surface composed of fragile, brittle, soft, cretaceous or chalky aculei, ≤2 aculei per mm, ≤3.5 mm long, terete to conical then gradually tapering to an acute or rounded apex, single at first then fused at base or along entire length, occasionally reticulate, smooth or studded with tiny, round tubercles, apices concolorous with base of aculei or pale yellow, often broken off. Margin cream white, byssoid, fibrillose.

Hyphal system monomitic with clamped generative hyphae. Aculei composed of non-agglutinated tramal hyphae arranged in a fascicle with embedded tramal cystidia curving into hymenium, at aculeal apex terminal hyphae undifferentiated, smooth; tramal hyphae (1.5–)2–3(–4) µm diam, clamped, sparingly branched, even, walls distinct, hyaline, thin, smooth, sometimes weakly cyanophilous. Subiculum 300–700 µm thick, a non-

Figs 14–24. ***Dendrophysellum amurense*** (holotype TAAM 015561). 14. Dichohyphidium with cyanophilous walls; 15. dichohyphidium with dextrinoid walls in Melzer's reagent. ***Hyphoradulum conspicuum*** (isotype PRM 834887). 16. Aculei; 17. close-up of aculei. ***Polyporus polyacanthophorus*** (BPI 0261328). 18. Hyphal pegs from hymenial surface. ***Favolus curtipes*** (isotype HUH 00290582). 19. Close-up of poroid surface; 20. poroid surface of basidiome. ***Mycothele disciformis*** (isotype BPI 0261300). 21. Close-up of basidiomes. ***Polyporus epitheloides*** (BPI 0261319). 22. Close-up of apically encrusted hyphal pegs. ***Mycobonia winkleri*** (holotype F–15807). 23. Cross-section of "hyphal peg" or bulbil; 24. close-up of hymenial surface with "hyphal pegs" or bulbils. Scale bars: 14, 15 = 10 µm; 16, 18, 19 = 2 mm; 17, 21, 24 = 1 mm; 20 = 20 mm; 22 = 0.5 mm; 23 = 50 µm.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agglutinated tissue; subicular hyphae 1–5 µm diam, clamped, walls hyaline, thin, smooth. Subhymenium ≤40 µm thick, composed of short-celled hyphae in a dense non-agglutinated tissue; subhymenial hyphae 2–3 µm diam, clamped, frequently branched, walls hyaline, thin, smooth. Hymenium ≤35 µm thick, a dense palisade of hyphidia, cystidia, and basidia. Hyphidia scarce, inconspicuous, filamentous to subulate, 15–23 × 1.5–3 µm, clamped at base, walls hyaline, thin, smooth. Cystidia of two types: (a) arising from aculei trama, subiculum, and subhymenium, abundant, embedded, broadly cylindrical, clavate, or obclavate, often strangulated or moniliform, sometimes with a lateral lobe, stalked, apex obtuse, occasionally branched, (27–)40–80 × 5–10 µm, tapering to 1.5–3 µm diam at base, with a basal clamp, often with honey yellow, refractive contents, walls hyaline, thin, smooth, negative in sulfovanillin; (b) arising from hymenium, rare, clavate to cylindrical but sometimes with a small, lateral beak, 11–15 × 4–5 µm, with a basal clamp, walls hyaline, thin, smooth. Basidia clavate, often with a distinct stalk, (16–)20–35 × 5–6 µm, clamped at base, walls hyaline, thin, smooth, 4-sterigmate. Basidiospores ellipsoid with a small apiculus, (4.8–)5–5.8(–6) × 3.5–4.4 µm, average of isotype 5.4 ± 0.4 × 4 ± 0.2 µm, Q = 1.3 ± 0.1, filled with numerous oil-like globules, walls hyaline, slightly thickened, smooth, cyanophilous, not reacting in Melzer's reagent.

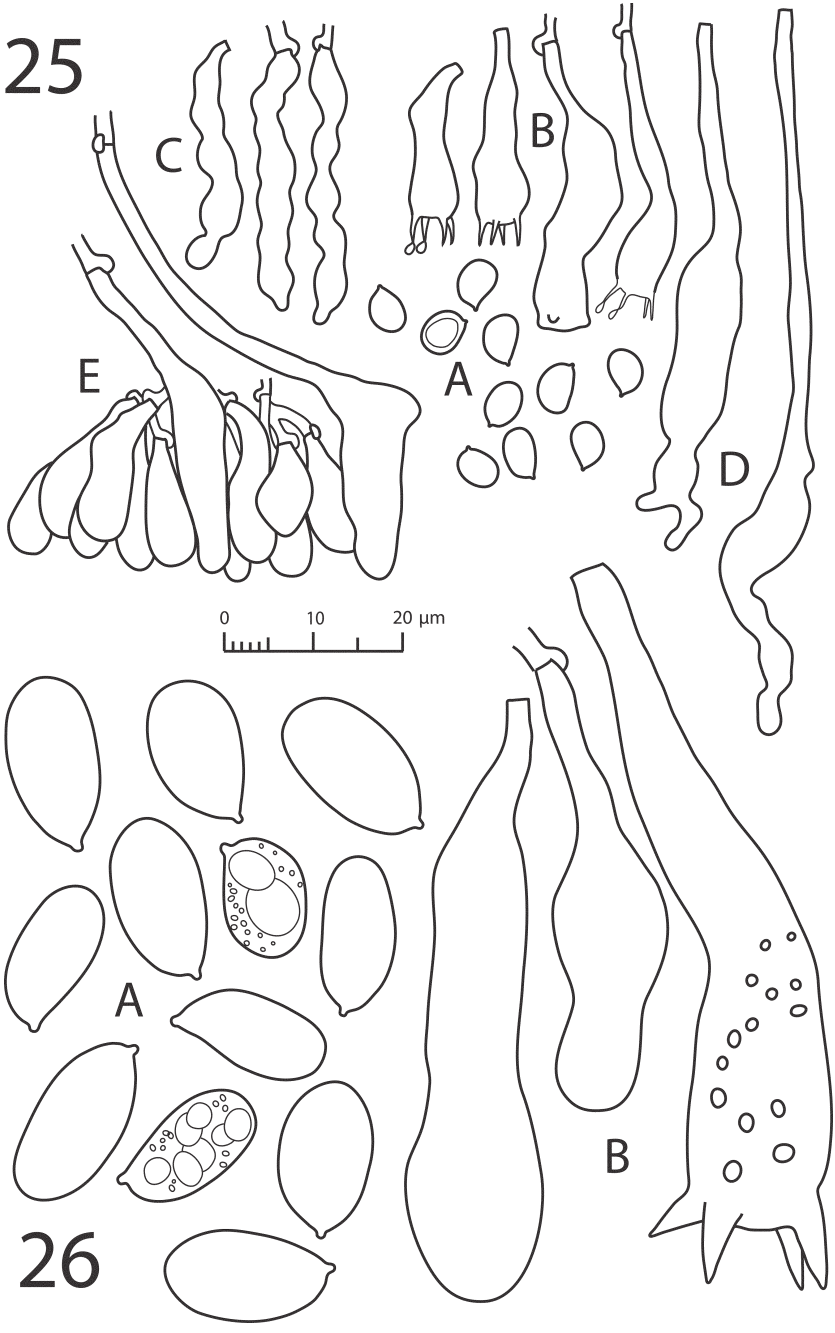
Habitat & distribution — Saprophytic on wood and bark of dead *Cornus;* known from the type location, Bohemia.

Type specimens examined — **CZECH REPUBLIC**. Bohemica: "Velká hora" hill near Karlštejn, on base of dead *Cornus mas* L., 2 Oct 1981, Z Pouzar (PRM 834886, **holotype**; PRM 834887, **isotype**).

Comments — *Pseudolagarobasidium conspicuum* is characterized by soft, brittle, cretaceous or chalky aculei, strangulated or monilioid cystidia with honey-yellow contents, and ellipsoid basidiospores with slightly thickened, cyanophilous walls. Microbinding hyphae were not observed. Pouzar (1987) noted that old collapsed basidiospores have dextrinoid walls, which was not observed in this study. This is the first species of *Pseudolagarobasidium* J.C. Jang & T. Chen reported from Europe. The description above is based partially on Pouzar's (1987) observations. *Hyphoradulum conspicuum* is transferred to *Pseudolagarobasidium*, and *Hyphoradulum*, a monotypic genus, becomes a synonym of *Pseudolagarobasidium*.

This species is most similar to *P. pronum* (Berk. & Broome) Nakasone & D.L. Lindner with respect to color and texture of the basidiome.

Figs 25–26. ***Hyphoradulum conspicuum*** (isotype PRM 834887). 25. A. Basidiospores; B. basidia; C. hymenial cystidia; D. tramal cystidia; E. section through hymenium with tramal cystidia and immature basidia. ***Polyporus polyacanthophorus*** (TENN 57579). 26. A. Basidiospores; B. basidia.


25
C
B
E
A
D
0
10
20 µm
A
B
26

Pseudolagarobasidium pronum develops microbinding hyphae and has slightly smaller basidiospores (4–5.5 × 3–3.7(–4.3) µm) with weakly cyanophilous walls, whereas *P. conspicuum* lacks microbinding hyphae and has distinctly cyanophilous basidiospore walls. In addition, cystidia in *P. pronum* do not contain refractive, honey-yellow contents. *Pseudolagarobasidium conspicuum* is known from Europe, whereas *P. pronum* is reported from Asia, Australia, Sierra Leone (Nakasone & Lindner 2012), and a first report from Jamaica (Runaway Bay, on *Calliandra* sp., 12 Feb 2006, F. Dämmrich 8139 at CFMR). See Nakasone & Lindner (2012) for a description of *P. pronum* and other species of *Pseudolagarobasidium*.

The genus *Mycobonia*

Mycobonia Pat. was erected with the generic type *Hydnum flavum* Berk. (Patouillard 1894). *Mycobonia* was substituted for the illegitimate *Bonia* Pat., which had *Bonia papyrina* Pat. as its generic type (Patouillard 1892). These two generic names are not homotypic; thus, *Mycobonia* was published as a new genus rather than a replacement name. For a detailed nomenclatural history of *Mycobonia*, see Jülich (1976) and Martin (1939). One important feature of *Mycobonia* is the dense stand of hyphal pegs penetrating the smooth hymenial surface. Hyphal pegs are not restricted to *Mycobonia* but are produced in a number of basidiomycete species. For a key to basidiomycete taxa with hyphal pegs see Nakasone (2013). *Mycobonia* is readily distinguished from other taxa with hyphal pegs and non-septate basidia by its substipitate and pileate basidiomes.

The classification of *Mycobonia* is controversial because of its unique combination of morphological features. Donk (1964: 294) placed *Mycobonia* in the *Stereaceae* Pilát even as he noted a close relationship to *Pseudofavolus* Pat. in the *Polyporaceae* Fr. ex Corda. Jülich (1982: 186) created *Mycoboniaceae* Jülich for *Mycobonia,* placing the family in the *Polyporales*. Later, Singer (1986: 171) reduced *Mycoboniaceae* to a synonym of *Polyporaceae*. Other researchers also noticed striking morphological similarities between *Mycobonia* and *Polyporus* (Corner 1984: 102; Krüger 2002; Krüger & Gargas 2010; Ryvarden 1991: 213, 2010: 119) and between *Mycobonia* and *Pseudofavolus* (Corner 1984: 36, Krüger 2002, Krüger & Gargas 2010, Singer 1986: 171). Authors have generally agreed that *Pseudofavolus* is closely related to *Polyporus* s.s. (Núñez & Ryvarden 1995: 68, Ryvarden 1991: 213), while some consider *Pseudofavolus* a synonym of *Polyporus* (Corner 1984: 35, Krüger 2002, Krüger & Gargas 2010).

Molecular phylogenetic studies show that *Mycobonia* and *Pseudofavolus* are sister taxa embedded in the core polyporoid clade (Binder et al. 2013; Krüger 2002; Krüger & Gargas 2004, 2010; Sotome et al. 2008), confirming

morphological observations. Based on phylogenetic studies and morphological similarities, Krüger (2002) and Krüger & Gargas (2010) reduced *M. flava* to a subspecies of *Polyporus curtipes* (Berk. & M.A. Curtis) Ryvarden. While agreeing with these authors that the molecular and morphological evidence overwhelmingly indicates that *Mycobonia* is a synonym of *Polyporus*, significant differences in ITS sequences and basidiospore shape and size argue for the recognition of *M. flava* and *M. brunneoleuca* as distinct species. Transfer of these taxa requires replacement names because both species epithets are preoccupied in *Polyporus*.

Mycobonia brunneoleuca (Berk. & M.A. Curtis) Pat., Bull. Soc. Mycol. France 16: 181. 1901 (1900). Figs 18, 26–27

≡ *Hydnum brunneoleucum* Berk. & M.A. Curtis, Trans. Linn. Soc. London 22: 129. 1857, non *Polyporus brunneoleucus* Berk. 1846.

≡ ***Polyporus polyacanthophorus*** Nakasone, **nom. nov.**

MycoBank MB812357

Etymology: from the Greek, *poly-* (many) + *acantha* (spine) + *-phorus* (bearing), referring to the numerous hyphal pegs in the hymenial surface.

Basidiome pileate, sessile or substipitate, coriaceous, flabellate, reniform. Pileus galeaeform or helmet-shaped, ≤10 × 8 cm; upper surface smooth, becoming radially rugulose, bright yellow when fresh, drying to dull greyish orange (5B6), brown (7D7), reddish brown (9E6), Vinaceous-Russet, Pecan Brown, or Kaiser Brown. Stipe reduced, usually black, 3.5–9 mm diam, attached to substrate by a thin, circular pad, ≤8–13 mm diam. Context ≤4 mm thick at base, thinning to 0.3 mm at pileus edge, pale orange (5A3), coriaceous. Hymenial surface appearing smooth but densely covered with minute, conical hyphal pegs, ≤330 × 40–80 µm, 9–12 pegs per mm, becoming fimbriate at apex, purplish tan when fresh, drying to greyish orange (5B3), brownish orange to light brown [6(C–D)5], or Cinnamon Buff.

Hyphal system dimitic with clamped generative and aseptate skeleto-binding hyphae. Hyphal pegs a dense fascicle of non-agglutinated, sparsely branched skeleto-binding hyphae, ≤330 µm long, originating 100–150 µm below hymenium, projecting ≤180 µm, encrusted at apex with coarse, irregular, hyaline crystals; hyphae rigid, tapering to acute apex, ≤3 µm, walls hyaline to light brown, slightly thick, smooth, cyanophilous, weakly dextrinoid. Context a densely interwoven, non-agglutinated tissue composed mostly of skeleto-binding hyphae and some generative subicular hyphae; subicular hyphae 3–6.5 µm diam, clamped, strangulated, staining in phloxine, walls hyaline, thin, smooth; skeleto-binding hyphae (0.5–)1.5–5.5 µm diam, occasionally inflated ≤12 µm diam, then tapering to tips, with a narrow lumen, aseptate, rarely to

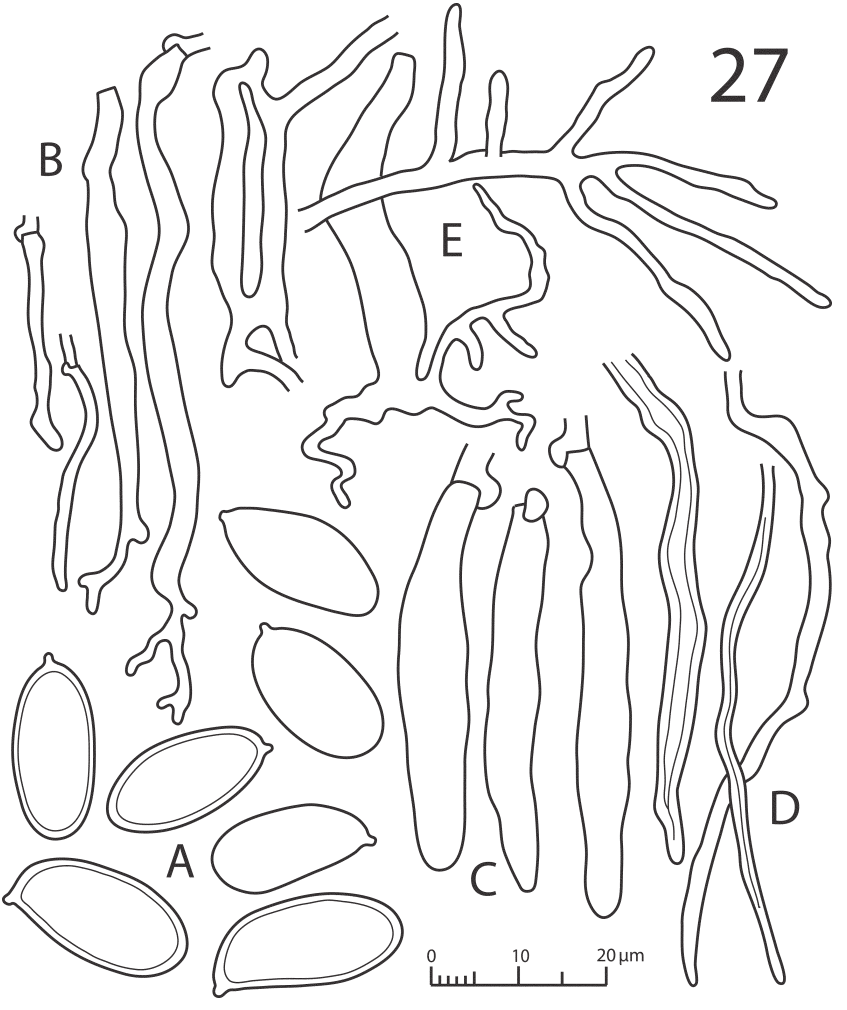


Fig. 27. ***Polyporus polyacanthophorus*** (NY 00536422). A. Basidiospores; B. thin-walled hyphidia; C. cystidia; D. hyphidia from hyphal pegs; E. skeleto-binding hyphae from context of NY 00543220.

extensively branched, walls hyaline, ≤1.5 µm thick, smooth, acyanophilous, not reacting in Melzer's reagent. Subhymenium a dense, thickening, non-agglutinated tissue of upright, short-celled hyphae; subhymenial hyphae 3.5–4.5µm, clamped, frequently branched, walls hyaline, thin, smooth. Hymenium a dense palisade of hyphidia, cystidia, and basidia. Hyphidia or two types: (a) inconspicuous, filamentous, often with short branches at apex, (23–)32–60

(–80) × 2–4 µm, clamped at base, walls hyaline, thin, smooth; (b) numerous, acicular or narrowly cylindrical then tapering to a subacute or acute tips, 1.5–4 µm diam, with a narrow lumen, aseptate, sparsely branched, walls hyaline, slightly thick to thick, smooth, acyanophilous, not reacting in Melzer's reagent (may be interpreted as terminal ends of skeleto-binding hyphae). Cystidia of two types: (a) rare, inconspicuous, embedded, subfusiform to cylindrical, tapering slightly to apex, 45–55 × 6–7.5 µm, clamped at base, walls hyaline, thin, smooth; (b) rare, obclavate, an enlarged bulbous base tapering to apex, 25–45 × (6–)10–15 µm, aseptate, walls hyaline, ≤1 µm thick, smooth, acyanophilous, not reacting in Melzer's reagent. Basidia scarce, clavate with a stalk, ≤80 × 10–16 µm, clamped at base, walls hyaline, thin, smooth, with 4-sterigmata. Basidiospores cylindrical to narrowly ellipsoid or broadly subfusiform with a small, distinct, hyaline apiculus, (13–)16–24(–26.5) × (7.2–)8–11(–12.3) µm, average of three specimens 17.3–21 × 9.4–10.1 µm, Q = 1.9–2.2, containing oil-like material, walls hyaline to light brown, thin to 0.7 µm thick, smooth, acyanophilous or weakly cyanophilous, not reacting in Melzer's reagent.

Habitat & distribution — On logs, branches and twigs of dead hardwoods throughout Central and South America and the Caribbean region.

Type specimen examined — **VENEZUELA**. Fendler 129 (FH HUH-00290586, **isotype** of *H. brunneoleucum*).

Representative specimens examined — **BRAZIL**. Prov. São Paulo: S. Framisco dos Campos, Dec 1896, F Noark 333 (S F–177421); Caldas, pnu. Miras Gerais, Regnell (S F–249624). **COLUMBIA.** Dept. del Cauca: Cordillera Central, Hoya del Rio Palo, Ta Tolda, 1944, J Ceratrecas 19440 (BPI 0261323); Munchique, 2700 m elev., on dead wood, 5 May 1968, AL Welden 7318 (NY 00536422). **COSTA RICA**. Puntarenas Province: Monteverde, on recently cut small trees, 8 Jan 1973, AL Welden 3303 (NY 00543220); Sta. Elena, road to Elena Biological Reserve, on fence post, 17 Mar 1999, RH Petersen 10256 (TENN 57579). San José Province: San Isidro de Coronado, on fallen log, 21 Jun 1972, AL Welden 8338 (NY 00536420); Monté Zurquí, alt. 2000–2500 m., on log, 13 Feb 1926, PC Standley & J Valerio no. 48084 (BPI 261325). Dota, Guadeloupe, Finca Jaular, km 66 on Interamerican Hwy, 1 Jul 1998, RH Petersen 9471 (TENN 56445). Heredia Province: Cerro Central de Zurqui, 1600 m., on dead log, 27 Dec 1929, CW Dodge no. 633 (BPI 261320). **HONDURAS**. Tegucigalpa, Escuela Agricola Panamericana, 31 Dec 1951, AS Mueller (BPI 261322). **PANAMA**. Chiriquí Province: valley of upper Rio Chiriquí Viejo, 1600–1800 m., 10 Jul 1935, GW Martin 2714 (BPI 261324, as "*M. flava*"); 6 Jul 1953, GW Martin 2519 (BPI 261238, as "*M. flava*"); 7 Jul 1935, GW Martin 2631 (NY 00536417, as "*M. flava*"). **PARAGUAY**. Asunción, San Antonii, July 1893, Malme (S F–249621). **PUERTO RICO**. Guajataca Community Forest, Verada, Nueva Trail, on deciduous wood, 26 Jun 1996, L Ryvarden (CFMR PR 5160).

Descriptions & illustrations — Gerlach & Loguercio-Leite (2011), Martin (1939: 248, figs 13–16, as *M. flava*), Jülich (1976, figs 1–2 only), Reid (1976: 191, fig. 2).

Comments — *Polyporus polyacanthophorus* is a pileate species characterized by a dense stand of hyphal pegs in the hymenium and large, cylindrical to

ellipsoid basidiospores. Although considered a synonym of *P. epitheloides* (as *M. flava*) by some mycologists, it can be differentiated by its larger basidia and broader basidiospores. In addition, the thin-walled, fusiform to cylindrical cystidia observed in *P. polyacanthophorus* are not present in *P. epitheloides*. Reid (1976) postulated that *P. polyacanthophorus* (as *M. brunneoleuca*) prefers higher elevation habitats than *P. epitheloides* (as *M. flava*).

The description above is based on Martin (1939), Reid (1976), and personal observations. A replacement name is proposed for *H. brunneoleucum* because the species epithet is occupied in *Polyporus*. Although Martin (1939: 247) considered *M. brunneoleuca* a synonym of *M. flava*, the specimens he referenced from Panama are redetermined here as *P. polyacanthophorus*. Similarly, the drawings of *M. flava* in Jülich (1976, Fig. 2) of an Argentinian specimen probably represent *P. polyacanthophorus* based on the basidiospore shape and size.

Mycobonia disciformis G. Cunn., Trans. Roy. Soc. New Zealand 83: 635. 1956.
FIGS 21, 28

≡ ***Mycothele disciformis*** (G. Cunn.) Jülich, Persoonia 8: 452. 1976.

BASIDIOMES resupinate, scattered to gregarious, disciform, centrally attached to substrate, orbicular to elongate, 1–10 mm diam, ≤0.5 mm thick, firm, membranous to ceraceous, spinose because of numerous hyphal pegs, exterior surface dark brown. HYMENIAL SURFACE smooth with numerous hyphal pegs penetrating surface, cream, dull sulfur-yellow, or light brown. HYPHAL PEGS cylindrical, tapering to a subacute apex, 20–30 per mm. MARGIN distinct, abrupt, free, slightly involute.

HYPHAL SYSTEM monomitic with clamped generative hyphae. HYPHAL PEGS originating deep in subicular trama, a dense, agglutinated fascicle of hyphae with an central column of coarse, hyaline crystals, ≤1000 × 45 µm, protruding ≤135 µm. SUBICULUM ≤800 µm thick with a basal layer of compact hyphae arranged parallel to substrate, then hyphae becoming upright, forming a dense but non-agglutinated tissue; subicular hyphae 2–3 µm diam, clamped, moderately branched, walls hyaline to brown, thin to slightly thick, smooth. HYMENIUM ≤70 µm thick, a dense palisade of hyphidia and basidia. HYPHIDIA filamentous, occasionally branched at apex, 20–40 × 2–2.5 µm, clamped at base, walls hyaline, thin, smooth. BASIDIA fragile, scarce, cylindrical to narrowly clavate, sometimes with a short, stalk-like base, (38–)45–60 × (7–)9–11(–14) µm, clamped at base, walls hyaline, thin, smooth, 4-sterigmate, sterigmata 7–10 × 1.5–2 µm. BASIDIOSPORES scarce, globose to subglobose or broadly ellipsoid, 8–13.5 × (6.5–)7–9(–10) µm, filled with oil-like globules, walls hyaline, thin, smooth, acyanophilous or weakly cyanophilous, not reacting in Melzer's reagent.

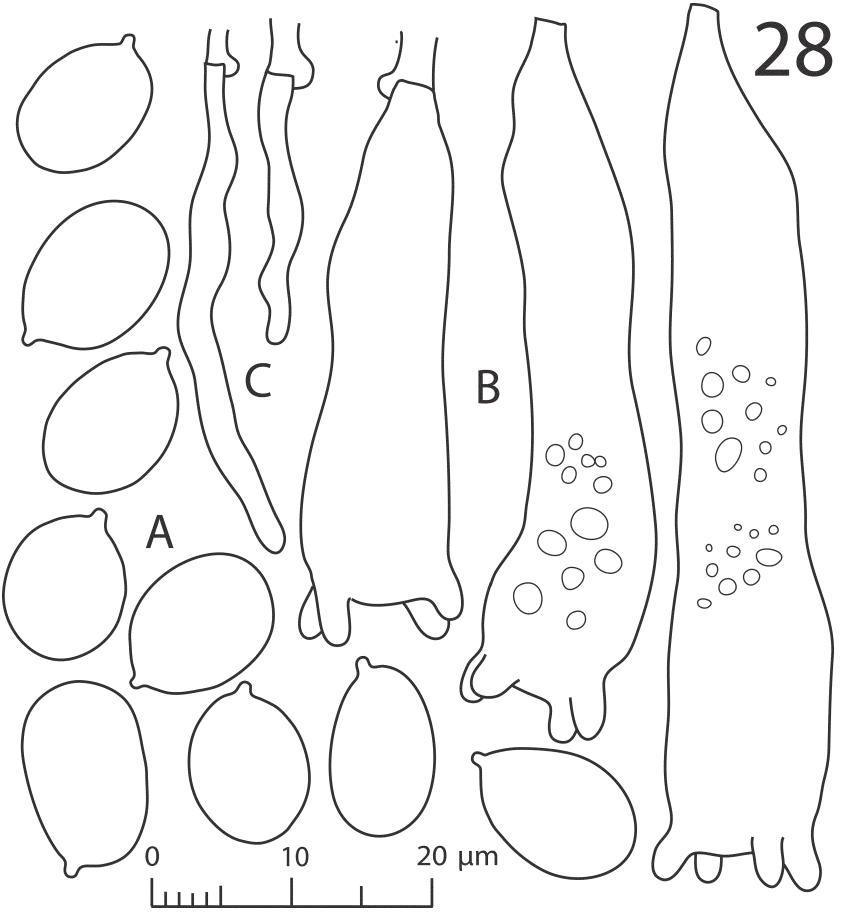


Fig. 28. ***Mycothele disciformis*** (isotype BPI 0261300). A. Basidiospores; B. basidia; c. hyphidia.

Habitat and distribution — On bark of living trunks of *Rhopalostylis sapida* H. Wendl. & Drude in New Zealand.

Type specimen examined — **NEW ZEALAND.** Auckland: Henderson Valley, 130 m., Sharps Bush, on bark of *R. sapida*, 5 May 1952, SD Baker PDD 11491 (BPI 261300, **isotype**). In the original description, the month is mistakenly reported as April (Cunningham 1956: 636).

Specimens examined — **NEW ZEALAND.** Auckland: Titirangi, Atkinson Park, on *R. sapida*, 27 Jun 1953, JM Dingley (PDD 12643); Coromandel Peninsula, Camel's Back, on *R. sapida*, Oct 1954, JM Dingley (PDD 14304); Waitakeres, Cascades, on *R. sapida*, 3 Apr 1954, SD Baker (PDD 14307).

Descriptions and illustrations — Cunningham (1956, 1963: 173), Jülich (1976).

Comments — *Mycothele disciformis* is characterized by small fragile disciform basidiomes with prominent hyphal pegs. *Epithele ryvardenii* Nakasone is an effused species that is reminiscent of *M. disciformis* because it produces brown-pigmented hyphae and has similarly sized and shaped basidia and basidiospores (Nakasone 2013). However, *M. disciformis* is found on bark of living nikau, an endemic New Zealand palm, whereas *E. ryvardenii* is reported from Venezuela on wood. *Mycothele disciformis* is undoubtedly closely related to *Epithele* (Pat.) Pat. Whether it should be transferred to *Epithele* or retained as a monotypic genus may be resolved in the future with molecular evidence.

Mycobonia flava (Sw. : Fr.) Pat., Bull. Soc. Mycol. France 10: 77. 1894. Figs 22, 29–30

≡ *Peziza flava* Sw. : Fr., Prod.: 150. 1788, non *Polyporus flavus* Jungh. 1838.

≡ *Hydnum flavum* (Sw. : Fr.) Berk., Ann. Mag. Nat. Hist., 10: 380. 1843 ["1842"].

≡ *Bonia flava* (Sw. : Fr.) Henn., Hedwigia 36: 192. 1897, as "(Berk.) Pat."

≡ *Auricularia flava* (Sw. : Fr.) Farl., Bibl. Index N. Amer. Fung.: 307. 1905.

≡ *Grandinioides flava* (Sw. : Fr.) Banker, Mem. Torrey Bot. Club 12: 179. 1906.

≡ *Polyporus curtipes* subsp. *flavus* (Sw. : Fr.) D. Krüger, Cryptog. Mycol. 31: 399. 2010.

≡ ***Polyporus epitheloides*** Nakasone, **nom. nov.**

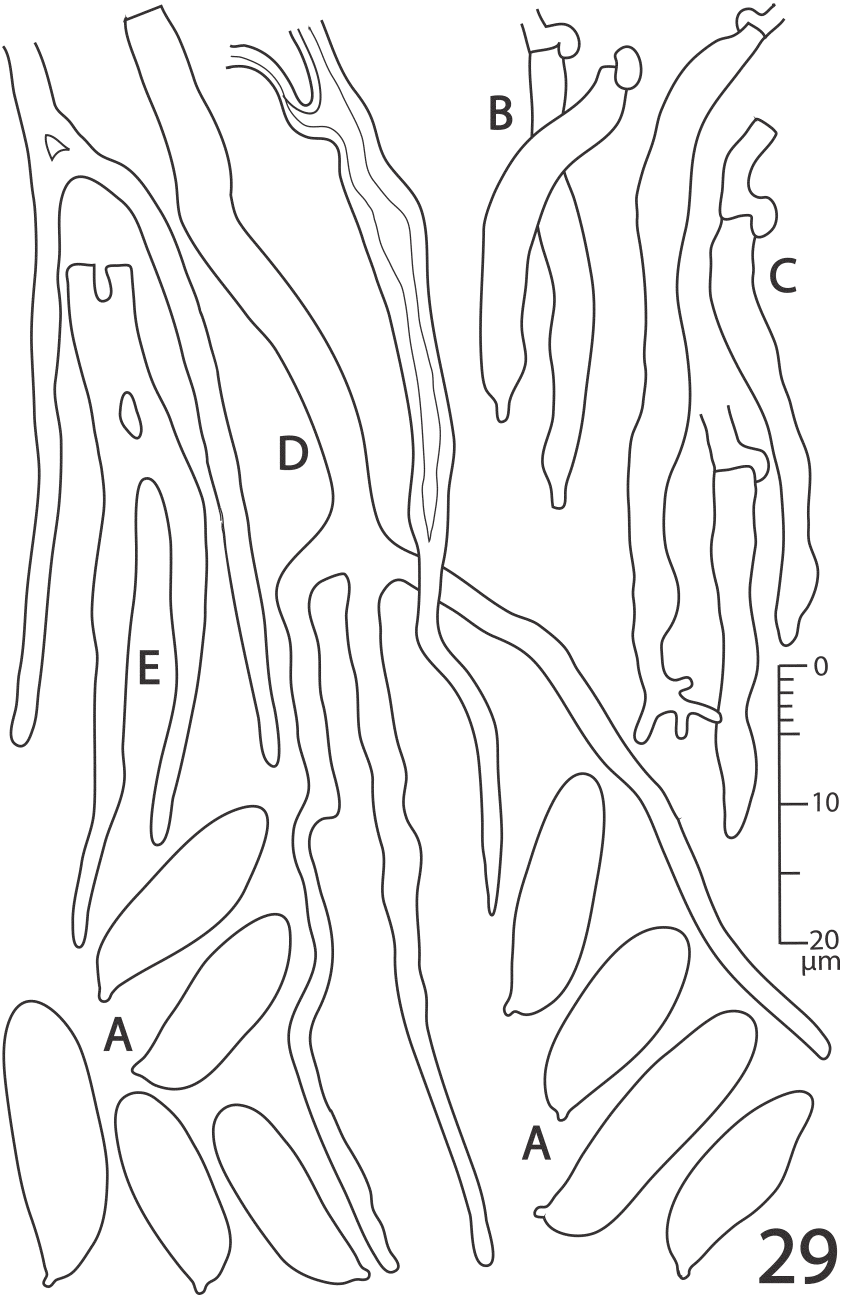
MycoBank MB812358

Etymology: refers to similarity with the genus *Epithele* which is characterized by hyphal pegs.

Basidiome pileate, dimidiate, flabelliform or reniform, sessile or substipitate, coriaceous. Pileus applanate, subdiscoid, or shallowly cucullate, ≤8 × 4 cm; upper surface smooth then becoming radially rugulose, when dried dull, pallid ochraceous, greyish orange (5B5) to brown [6D(7–8)] or purplish chestnut, darkening at edges to brown (6E8). Stipe short, ≤5 mm long by 3 mm diam, often black, attached to substrate by a thin, circular, mycelial pad, ≤8 mm diam. Context 1–6 mm thick at base, thinning to 0.5 mm at pileus edge, light orange (5A4), thin, coriaceous. Hymenial surface appearing smooth but densely covered with cylindrical hyphal pegs, ≤400 × 40–60 µm, 5–11 pegs per mm, pale ochraceous when fresh, drying to greyish orange (5B4), Light Ochraceous Buff, purplish buff, or light rusty buff.

Hyphal system dimitic with clamped generative and aseptate skeleto-binding hyphae. Hyphal pegs a dense fascicle of non-agglutinated, sparsely branched, skeleto-binding hyphae, originating in context, projecting ≤200 µm, heavily encrusted with coarse, irregular, hyaline crystals; hyphae 1–3 µm diam, aseptate, rarely branched, walls hyaline, slightly thick to thick, smooth, cyanophilous, weakly dextrinoid. Context a densely interwoven,

Fig. 29. ***Polyporus epitheloides*** (NY 00536421). A. Basidiospores; B. papillate hyphidia; C. thin-walled hyphidia; D. thick-walled hyphidia or skeleto-binding hyphae terminating in hymenium; E. cystidium.



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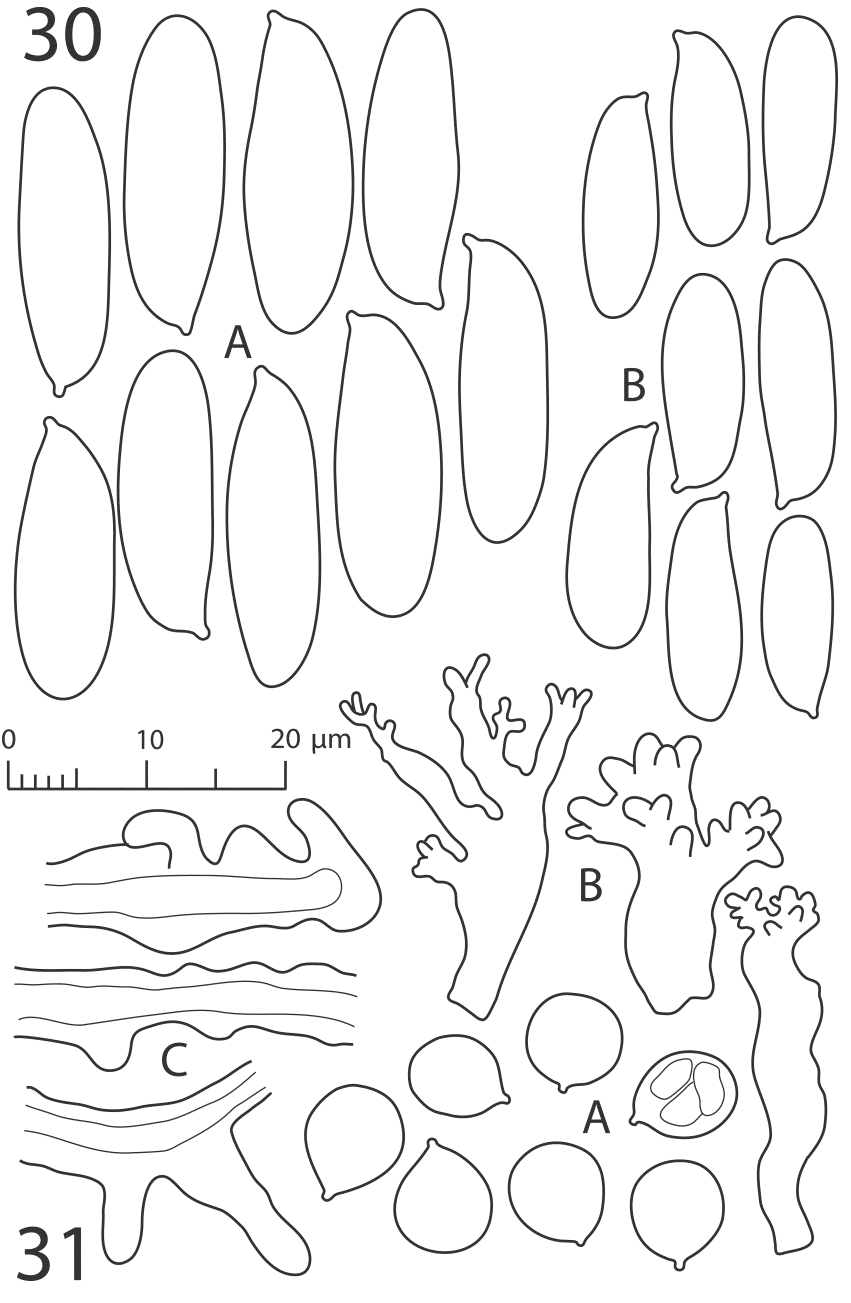
non-agglutinated tissue composed primarily of skeleto-binding hyphae and indistinct generative hyphae, in pileus cuticle hyphae similar but compacted into a cutis; generative hyphae 2.2–4 µm diam, clamped, walls hyaline, thin, smooth; skeleto-binding hyphae 2.2–5 µm diam, occasionally inflated ≤20 µm diam, aseptate, rarely to extensively branched, branches often elongate and whip-like, walls hyaline, thick, smooth, acyanophilous, not reacting in Melzer's reagent. Hymenium a dense palisade of hyphidia, cystidia, and basidia. Hyphidia of two types: (a) inconspicuous, scarce, filamentous, often with a few short branches at apex or papillate, 27–52 × 2–4 µm, clamped at base, walls hyaline, thin, smooth; (b) numerous, acicular or narrowly cylindrical then tapering to a subacute to acute apex, 30–60 × 2–4 µm, aseptate, walls hyaline, slightly thick, smooth, acyanophilous, not reacting in Melzer's reagent (may be interpreted as terminal branches of skeleto-binding hyphae). Cystidia rare, obclavate, an enlarged bulbous base then tapering to apex, 25–45 × (6–)10–15 µm, aseptate, walls hyaline, ≤1 µm thick, smooth, acyanophilous, not reacting in Melzer's reagent. Basidia clavate, 26–40 × 6–12 µm, clamped at base, walls hyaline, thin, smooth, with 4-sterigmata. Basidiospores cylindrical to subfusiform, 14–23(–26) × 5–8(–8.7) µm, average of three specimens 15.6–22.5 × 5.2–7.4 µm, Q = 3, filled with oil-like material, walls hyaline, thin, smooth, acyanophilous or weakly cyanophilous, not reacting in Melzer's reagent.

Habitat & distribution — On logs, branches and twigs of dead angiosperms from southeastern United States (Florida, Louisiana) to southeastern Brazil.

Representative specimens examined — **ARGENTINA**. Misiones Province: Urugua-í Provincial Park, Wanda, 26 May 2001, D Krüger 11279 (TENN 59088). **BRAZIL**. Rio Grande du Sol Province: São Leopoldo, 1904, Rick (S F–249620); Rick–Fungi Austro-Americano Exsiccati nr. 141, 1906 (S F–177427, F–177429); Ijuhy, Exped. Imae Regnelliana no. 345B, 7/4 1893, GA Malme (S F–177430). **COLOMBIA**. Cauca District: ad pag. El Tambo, 1700 m, 13 Nov 1937, Kv Snidern (S F–177424). Valle del Cauca Dept., elev. 1980 m., 23 km from Cali, on Cali-Cisneros, on branch, 30 Aug 1976, KP Dumont & LA Molina, Dumont–Co 7669 (NY). **COSTA RICA**. Puntrenas Province: Coto Brus County, San Vito, Hacienda La Amistad, 3 Jul 1998, RH Petersen 9486 (TENN 56514); Tablazo, 1800 m, 8 Aug 1932, M Valerio (S F–177432). Cartago Province: mountains east of Tulis and north of Plantanillo, 2 Sep 1968, DE Stone 7141 (NY 00536421). **CUBA**. Fungi Cubensis Wrightiani no. 343, [Wright] (S F–15535); Monte Verde, Fungi Cubensis Wrightiani no. 237, 7–4 1915, C Wright (S F–15533). Pinar del Rio Province: San Diego de Los Baños, on old log, 31 Aug to 3 Sep 1910, NL Britton, FS Earle & OS Gages, Britton 6823 (NY). **JAMAICA**. St. Ann Parish: near Reynolds bauxite mines, Lynford P.O., 1200–1400 ft., on dead branch of small tree, 23 Sep 1954, GR Proctor, F1288 (NY 00536418); Moneague to Hollymount via Union Hill, 700–750 m. elev., 6 Aug 1957, AL Welden 558 (NY 00536419). **PARAGUAY**. Alto Paraná State: Ciudad del Este Hernandarias, Tatí Jupí Reserve on Iaipu Lake, on

Figs 30–31. ***Polyporus epitheloides.*** 30. Basidiospores: A. from TENN 56514; B. from TENN 59088. ***Mycobonia winkleri*** (holotype F–15807). 31. A. Basidiospores; B. broom-like structures in pileus context; C. hyphal segments from pileus context.


30
A
B
0
10
20 µm
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A
31

hardwood branch, 25 May 2001, RH Petersen (TENN 58933); San Antonio Province: Asunción, Exped. Imae Regnellian Fungi, July 1893, GA Malme (S F–177425). **UNITED STATES**. Florida: Florida Caverns State Park, on dead wood, 5 May 1962, AL Welden 4428 (NY 00536416); Miami, on twigs, 15 Jan 1919, WH Long (CFMR FP 30869); Dade County, Matheson's Hammock, on twigs, 23 Feb 1922, JA Stevenson 1630 (BPI 261319). Louisiana: Plaquemines Parish, Tulane University, F. Edward Herbert Center, on dead wood, 25 Jul 1972, AL Welden 7764 (NY 00536411); St. Martinville, on fallen branches, 20 Aug 1898, AB Langlois 2817 (S F–249626).

Descriptions & illustrations — Burt (1919: 262), Corner (1984: 104), Jülich (1976: 450, description only), Patouillard (1894, plate III, fig. 2), Reid (1976: 190, figs 1, 5), Ryvarden (2010: 119).

Comments — *Polyporus epitheloides* is a pileate species characterized by a dense layer of hyphal pegs in the hymenium and large cylindric to subfusiform basidiospores. The peculiar thick-walled cystidia seen in this species were also observed in *P. polyacanthophorus* and could be interpreted as terminally differentiated skeleto-binding hyphae. Jülich (1976: 451) refers to these structures as tramal cystidia and includes an illustration. The description above is based on Jülich (1976), Reid (1976), and personal observations. Transfer of the species to *Polyporus* requires a new name because the epithet '*flavus*' is preoccupied.

Polyporus epitheloides is closely related to *P. polyacanthophorus* [≡ *M. brunneoleuca*] but can be differentiated by its narrowly cylindrical to subfusiform basidiospores that are usually <8 µm diam, Q = 3. *Polyporus epitheloides* has a wider distribution than *P. polyacanthophorus*, extending into southeastern United States. ITS sequences of *P. epitheloides* (AY513571 as *M. flava*) and *P. polyacanthophorus* (AY513569, AY513570 also as *M. flava*) differ by 5%, confirming their status as distinct species. Another similar species is *Pseudofavolus cucullatus* (Mont.) Pat. [= *Polyporus curtipes*]. It can be distinguished from *P. epitheloides* by its angular to hexagonal pores, 1–3 per mm, and smaller, cylindrical basidiospores (11.5–)13–16 × 4–6 µm (Ryvarden & Johansen 1980: 514). The isotype of *Favolus curtipes* Berk. & M.A. Curtis (South Carolina, Santee, Ravenel 378, HUH 00290582) was examined (see Figs. 19–20 for photographs of the poroid hymenophore).

Krüger (2002) and Krüger & Gargas (2010) considered *M. flava* to be a subspecies of *P. curtipes* despite a 4–7% difference in ITS sequences. They noted that *M. flava,* with spines, and *Ps. cucullatus*, with pores, were otherwise similar in basidiome coloration, hyphal construction, and shape and size of basidia and basidiospores. Because they are sister taxa embedded in *Polyporus* sensu stricto as demonstrated by phylogenetic analyses of the large subunit ribosomal RNA gene and ITS region, Krüger (2002) and Krüger & Gargas (2010) concluded that *M. flava* and *Ps. cucullatus* belong in *Polyporus*. Following Ryvarden (1991:

213), they accepted the name *P. curtipes* for *Ps. cucullatus* and then reduced *M. flava* to a subspecies of *P. curtipes*.

It should be noted that Krüger (2002) and Krüger & Gargas (2010) misidentified TENN 057579, FB 10256, as *M. flava*. Based on basidiospore size, this specimen represents *P. polyacanthophorus* [≡ *M. brunneoleuca*]. Thus, ITS (AY513569, AY513570) and LSU sequences (AJ487934) correspond to *P. polyacanthophorus* whereas AY513571, ITS sequence of TENN 059088, FB 11279, is correctly identified as *P. epitheloides* [≡ *M. flava*].

The following descriptions and illustrations should be used with caution, for the authors did not differentiate between *M. flava* and *M. brunneoleuca* or did not provide basidiospore measurements, so it is not possible determine the species involved — Banker (1906), Berkeley (1843, plate 10, fig. 8), Gibertoni et al. (2006), Hennings (1900), Ibañez (1999), and Lloyd (1915). Although Martin (1939: 247) considered *M. brunneoleuca* a synonym of *M. flava*, the specimens he cited from Panama are redetermined here as *P. polyacanthophorus*.

Mycobonia winkleri Bres., Ann. Mycol. 9: 551. 1911. Figs 23–24, 31

Basidiome dimidiate-sessile to subresupinate, 17 × 7 mm, 320–400 µm thick, soft, fragile, greyish orange (5B4). Pileus surface warty to wrinkled; hymenial surface smooth with warts, 2–3 per mm, with a dark cavity or reddish brown, mucilaginous material at apex; context cottony, orange white (5A2).

Hyphal system dimitic with clamped generative and aseptate skeletal hyphae. Warts consisting of bulbils embedded in context and hymenium, composed of pseudoparenchymatous tissue enclosing a mass of dark reddish brown, amorphous material. Pileus cortex a densely agglutinated tissue composed of irregularly thick-walled hyphae, thick-walled, broom-like structures, and scattered dichophyses; pileal hyphae 3–8 µm diam, clamped, with numerous short branches, irregular, walls hyaline, thick, smooth; broom-like structures 17–30 × 3–8 µm, with a thick, robust main trunk that gives rise to branches short and stubby or longer, ≤12 × 2 µm, with knobby protuberances, walls hyaline, thick, smooth, cyanophilous, not reacting in Melzer's reagent; dichophyses with short, slender branches radiating from a central point, walls hyaline, thick, smooth, cyanophilous, dextrinoid. Beneath cortex a narrow, moderately dense zone of generative subicular and skeletal hyphae, then a zone of open, loosely intertwined subicular hyphae and scattered dichophyses, about 140 µm thick; subicular hyphae 3–5 µm diam, clamped, moderately branched, walls hyaline, thin to 2 µm thick, sometimes irregularly thickened, smooth, acyanophilous, not reacting in Melzer's reagent; skeletal hyphae 1.3–2.2 µm

diam, aseptate, sparsely branched, walls hyaline, thick, smooth, cyanophilous, dextrinoid in Melzer's reagent. Subhymenium a dense, agglutinate tissue of hyphae similar to subicular hyphae. Hymenium a dense, agglutinated palisade of basidia. Basidia clavate, 25–28 × 12 µm, bisterigmate (Bresadola, 1911). Basidiospores scarce, globose, subglobose or broadly lacrymoid, 6–7.5(–7.9) × (5.5–)6–7.2 µm, walls hyaline, thin, smooth, cyanophilous, not reacting in Melzer's reagent.

Type specimen examined — S.O. **BORNEO**, ad *Calamus rotang*, 24 Jun 1902, H Winkler 2605 (S F–15807, **holotype**).

Comments — *Mycobonia winkleri* is a conundrum. The fungus displays a bewildering array of morphological features and the name cannot be placed in any extant genus. In the first place, the unusual structures that resemble hyphal pegs in *M. winkleri* (and probably the reason Bresadola placed the species in *Mycobonia*) are not composed of hyphae but consist of an amorphous reddish brown material. Second, the cyanophilous dextrinoid dichohyphidia developed in *M. winkleri* resemble those found in some species of *Vararia* P. Karst., such as *V. minidichophysa* Boidin & Lanq., *V. microphysa* Boidin & Lanq., and *V. tropica* A.L. Welden. Boidin et al. (1980) described these structures as capillary dichophyses. Two species of *Amyloflagellula* Singer, *A. verrucosa* Agerer & Boidin and *A. inflata* Agerer & Boidin, also develop similar dichohyphidia (Agerer & Boidin 1981). Third, the broom-like structures found in the pileus cortex recall those produced in the pileipellis and gills of some *Marasmius* Fr. species. However, the rather large, dimidiate-sessile basidiome of *M. winkleri* is unlike that of *Vararia* (effused), *Amyloflagellula* (cup-shaped), or *Marasmius* (mushroom-shaped).

It is premature to erect a new genus for *M. winkleri* at this time. The type is fragile and somewhat deteriorated. Additional collections are needed to confirm that the disparate characters are produced by this taxon. The hyphal peg-like structures are particularly mysterious and in need of further study. DNA sequence data would be desirable to discover its closest relatives.

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Literature cited

Agerer R, Boidin J. 1981. The genus *Amyloflagellula* in West Africa (*Basidiomycetes*, *'Cyphellaceae'*). Sydowia 34: 1–12.

Banker HJ. 1906. A contribution to a revision of the North American *Hydnaceae*. Mem. Torrey Bot. Club 12: 99–194.

Berkeley MJ. 1843 ["1842"]. Notices of fungi in the herbarium of the British Museum. Ann. Mag. Nat. Hist. 10(suppl.): 369–385.

Binder M, Larsson K-H, Matheny PB, Hibbett DS. 2010. *Amylocorticiales* ord. nov. and *Jaapiales* ord. nov.: Early diverging clades of *Agaricomycetidae* dominated by corticioid forms. Mycologia 102: 865–880. http://dx.doi.org/10.3852/09-288

Binder M, Justo A, Riley R, Salamov A, Lopez-Giraldez F, Sjökvist E, Copeland A, Foster B, Sun H, Larsson E, Larsson K-H, Townsend J, Grigoriev IV, Hibbett DS. 2013. Phylogenetic and phylogenomic overview of the *Polyporales*. Mycologia 105: 1350–1373. http://dx.doi.org/10.3852/13-003

Boidin J, Gilles G. 1991. Basidiomycètes *Aphyllophorales* de l'Île de la Réunion. XVI. Les genres *Hyphoderma, Hyphodermopsis, Chrysoderma* nov. gen. et *Crustoderma*. Cryptog. Mycol. 12: 97–132

Boidin J, Lanquetin P. 1975. *Vararia* subgenus *Vararia* (*Basidiomycètes Lachnocladiaceae*): étude spéciale des espèces d'Afrique intertropicale. Bull. Trimestriel Soc. Mycol. France 91: 457–513.

Boidin J, Lanquetin P, Gilles G. 1980. Application du concept biologique de l'espèce aux Basidiomycètes: le genre *Vararia* (section *Vararia*) au Gabon. Cryptog. Mycol. 1: 265–384.

Bresadola J. 1911. Fungi Borneenses. Lecti a cl. Hubert Winkler anno 1908. Ann. Mycol. 9: 549–553.

Burt EA. 1919. The *Thelephoraceae* of North America. XI. *Tulasnella, Veluticeps, Mycobonia, Epithele,* and *Lachnocladium*. Ann. Missouri Bot. Gard. 6: 253–281. http://dx.doi.org/10.2307/2990131

Burt EA. 1926. The *Thelephoraceae* of North America. XV. *Corticium*. Ann. Missouri Bot. Gard. 13: 173–354. http://dx.doi.org/10.2307/2394065

Corner EJH. 1984. Ad *Polyporaceas* II — *Polyporus*, *Mycobonia*, and *Echinochaete*. Beih. Nova Hedwigia 78. 129 p.

Cunningham GH. 1956. *Thelephoraceae* of New Zealand— Parts VII and VIII. Part VIII — The genera *Epithele* and *Mycobonia*. Trans. Roy. Soc. New Zealand 83: 628–636.

Cunningham GH. 1963. The *Thelephoraceae* of Australia and New Zealand. Bull. New Zealand Dept. Sci. Industr. Res. 145. 359 p.

Donk MA. 1964. A conspectus of the families of *Aphyllophorales*. Persoonia 3: 199–324.

Gerlach ACL, Loguercio-Leite C. 2011. Hydnoid basidiomycetes new to Brazil. Mycotaxon 116: 183–189. http://dx.doi.org/10.5248/116.183

Gibertoni TB, Ryvarden L, de Queiroz Cavalcanti MA. 2006. Steroid fungi (*Basidiomycota*) of the Atlantic Rain Forest in northeast Brasil. Nova Hedwigia 82: 105–113. http://dx.doi.org/10.1127/0029-5035/2006/0082-0105

Ginns J. 1976. *Corneromyces kinabalui*, gen nov., sp. nov. (*Aphyllophorales*, *Coniophoraceae*). Mycologia 68: 970–975. http://dx.doi.org/10.2307/3758712

Hennings P. 1900. *Hymenomycetineae*. 104–276, in: A Engler, K Prantl (eds). Die natürlichen Pflanzenfamilien. Teil I, Abt. 1**. Leipzig, Wilhelm Engelmann. [http://www.biodiversitylibrary.org/item/23586].

Hjortstam K. 1983. Studies in tropical *Corticiaceae* (*Basidiomycetes*) V. Specimens from East Africa collected by L. Ryvarden. Mycotaxon 17: 555–572.

Hjortstam K, Larsson K-H. 1995. Annotated check-list to genera and species of corticioid fungi (*Aphyllophorales*, *Basidiomycotina*) with special regards to tropical and subtropical areas. Windahlia 21. 75 p.

Hjortstam K, Ryvarden L. 2001. Corticioid species (*Basidiomycotina*, *Aphyllophorales*) from Colombia III. Mycotaxon 79: 189–200.

Hjortstam K, Ryvarden L. 2008. Some corticioid fungi (*Basidiomycotina*) from Ecuador. Syn. Fungorum 25: 14–27.

Höhnel F. 1910. Fragmente zur Mykologie. XII. Mitteilung, Nr. 574 bis 641. Sitzungsber. Kaiserl. Akad. Wiss. Wien, Math.-Naturwiss. Cl., Abt. 1, 119: 877–958.

Höhnel F, Litschauer V. 1907. Beiträge zur Kenntnis der Corticieen (II. Mitteilung). Sitzungsber. Kaiserl. Akad. Wiss. Wien, Math.-Naturwiss. Cl., Abt. 1, 116: 739–852.

Ibañez CG. 1999. Cultural studies of non-poroid *Aphyllophorales*. Mycotaxon 71: 457–471.

Jülich W. 1975. On *Cerocorticium* P. Henn., a genus described from Java. Persoonia 8: 217–220.

Jülich W. 1976. Studies in hydnoid fungi I. On some genera with hyphal pegs. Persoonia 8: 447–458.

Jülich W. 1979. Studies in resupinate *Basidiomycetes* — VI. On some new taxa. Persoonia 10: 325–336.

Jülich W. 1982 ["1981"]. Higher taxa of *Basidiomycetes*. Biblioth. Mycol. 85. 485 p.

Kirk PM, Cannon PF, Minter DW, Stalpers JA (eds.). 2008. Dictionary of the fungi, 10th edition. Wallingford, CABI.

Kornerup A, Wanscher JH. 1978. Methuen handbook of colour. Eyre Methuen, London.

Kotlaba F, Pouzar Z. 1964. Preliminary results on the staining of spores and other structures of *Homobasidiomycetes* in cotton blue and its importance for taxonomy. Trans. Brit. Mycol. Soc. 47: 653–654.

Krüger D. 2002. Monographic studies in the genus *Polyporus* (*Basidiomycotina*). PhD dissertation, Department of Botany, University of Tennessee. Knoxville.

Krüger D, Gargas A. 2004. The basidiomycete genus *Polyporus* — an emendation based on phylogeny and putative secondary structure of ribosomal RNA molecules. Feddes Repert. 115: 530–546. http://dx.doi.org/10.1002/fedr.200311052

Krüger D, Gargas A. 2010. Unusual polypore fungi — a taxonomic emendation of *Polyporus* (*Basidiomycotina*) after ribosomal spacer characters. Cryptog. Mycol. 31: 389–401.

Liberta AE. 1969. Descriptions of the nomenclatural types of corticiums described by Burt. Nova Hedwigia 18: 215–233.

Lloyd GC. 1915. Letter no. 56, pp. 1–12. Mycological Writings 4.

Maekawa N, Suhara H, Kinjo K, Kondo R. 2003. Corticioid fungi (*Basidiomycota*) in mangrove forests of the islands of Iriomote and Okinawa, Japan. Mycoscience 44: 403–409. http://dx.doi.org/10.1007/S10267-003-0133-0

Martin GW. 1939. New or noteworthy fungi from Panama and Colombia. III. Mycologia 31: 239–249. http://dx.doi.org/10.2307/3754518

Nakasone KK. 2008. Type studies of corticioid *Hymenomycetes* described by Bresadola. Cryptog. Mycol. 29: 231–257.

Nakasone KK. 2013. Taxonomy of *Epithele* (*Polyporales*, *Basidiomycota*). Sydowia 65: 59–112.

Nakasone KK, Lindner DL. 2012. Taxonomy of *Pseudolagarobasidium* (*Polyporales*, *Basidiomycota*). Fungal Diversity 55: 155–169. http://dx.doi.org/10.1007/s13225-012-0161-1

Núñez M, Ryvarden L. 1995. *Polyporus* (*Basidiomycotina*) and related genera. Syn. Fungorum 10. 85 p.

Parmasto E. 1968. Conspectus systematis corticiacearum. Tartu, Academiae Scientiarum R.P.S.S. Estonicae.

Patouillard MN. 1892. Champignons nouveaux Extra-Européens. Bull. Soc. Mycol. France 8: 46–56.

Patouillard MN. 1894. Espèces critiques d'*Hyménomycètes*. Bull. Soc. Mycol. France 10: 75–81.

Pouzar Z. 1987. Taxonomic studies in resupinate fungi III. Česká Mykol. 41: 26–28.

Reid DA. 1976. Notes on polypores. 2. Mem. New York Bot. Gard. 28: 179–198.

Ridgway, R. 1912. Color standards and color nomenclature. Washington, DC, publ. by author.

Ryvarden L. 1991. Genera of polypores — nomenclature and taxonomy. Syn. Fungorum 5. 363 p.

Ryvarden L. 2010. Stereoid fungi of America. Syn. Fungorum 28. 206 p.

Ryvarden L, Johansen I. 1980. A preliminary polypore flora of East Africa. Oslo, Fungiflora.

Singer R. 1986. The *Agaricales* in modern taxonomy. Koenigstein, Koeltz Scientific Books.

Sotome K, Hattori T, Ota Y, To-anun C, Salleh B, Kakishima M. 2008. Phylogenetic relationships of *Polyporus* and morphologically allied genera. Mycologia 100: 603–615. http://dx.doi.org/10.3852/07-191R

Talbot PHB. 1951. Studies of some South African resupinate *Hymenomycetes*. Bothalia 6: 1–116.

Thiers B. 2014 [continuously updated]. Index Herbariorum: a global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. http://sweetgum.nybg.org/ih/ [accessed January 2014].

Trierveiler-Pereira L, Baltazar JM, Loguercio-Leite C. 2009. Santa Catarina Island mangroves 4 — xylophilous basidiomycetes. http://www.mycotaxon.com/resources/checklists/trierveiler-v109-checklist.pdf [Summary: Mycotaxon 109: 107–110. http://dx.doi.org/10.5248/109.107].

Wu S-H, Chen Z-C. 1990. New records of *Corticiaceae* (*Basidiomycetes*) collected from the National Taiwan University campus. Taiwania 35: 64–67.